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SHORT COMMUNICATION

Two new synonyms in Western Australian Proteaceae: *Isopogon heterophyllus* and *I. teretifolius* subsp. *petrophiloides*

Isopogon R.Br. is a southern Australian genus of Proteaceae. Thirty-five species and seven additional infraspecific taxa were recognised when the genus was treated in Volume 16 of *Flora of Australia* (Foreman 1995). Two of these taxa have proved to be insufficiently distinctive to be retained. *Isopogon heterophyllus* Meisn. is reduced here to a synonym of *I. formosus* R.Br. subsp. *formosus*, and subspecies are no longer recognised for *I. teretifolius* R.Br., with subsp. *petrophiloides* (R.Br.) Foreman reduced to synonymy.

Isopogon formosus R.Br., *Trans. Linn. Soc. London* 10: 72 (1810); *Atylus formosus* (R.Br.) Kuntze, *Revis. Gen. Pl.* 2: 577 (1891). *Type*: King George Sound [Western Australia], December 1801, *R.Brown s.n.* [Bennett No. 3248] (*syn*: BM 001191226 & 000991919, K 000736631 & 00736632, MEL 1531489, NSW 131384).

Common name. Rose Coneflower.

Notes. This species has two significant disjunctions dividing its known range into western, central and eastern areas. Two geographically separated subspecies are recognised, with subsp. *dasylepis* (Meisn.) Foreman occupying the western area and subsp. *formosus* the other two areas.

Foreman (1995: 208) was concerned that his recognition of two subspecies was 'not completely satisfactory, since a considerable number of specimens of *I. formosus* cannot be convincingly assigned to either subspecies'. While it is true that the distinguishing characters used by Foreman do not allow a complete separation, our assessment is that foliar and indumentum differences support their continued recognition (Table 1). All specimens at the Western Australian Herbarium (PERTH) have been assigned to a subspecies.

Table 1. Diagnostic characters for the two subspecies of *Isopogon formosus*.

	Subspecies *dasylepis*	Subspecies *formosus*
Leaves	tightly involute throughout; adaxial surface scarcely visible	variably involute; adaxial surface always partially visible, although sometimes only on the ultimate divisions or at the junctions where they arise
Stem directly below inflorescence	glabrous or occasionally with a few short hairs	densely hairy, often with long, spreading hairs
Involucral bracts	glabrous or rarely with a few short hairs on abaxial surface	hairy on abaxial surface
Cone scales	glabrous on the distal half of abaxial surface	hairy throughout on abaxial surface

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a. Isopogon formosus subsp. **dasylepis** (Meisn.) Foreman, *Fl. Australia* 16: 479 (1995). *Isopogon formosus* var. *dasylepis* Meisn. in A.L.P.P. de Candolle, *Prodr.* 14: 278 (1856). *Type citation*: 'Drumm, n. 295! Preiss, n. 670!'. *Type specimens*: 'In solo limoso planitiei ad flum Vasse, Sussex. Country' [Vasse River, Western Australia], 17 December 1839, *J.A.L. Preiss* 670 (*syn*: LD 1315766, MEL 1532914 & 1535661); [no precise locality, Western Australia], *s. dat.*, *J. Drummond* 295 (*syn*: K 000736630, LD 1829489, MEL 1532915).

Illustration. J.R. Wheeler, N.G. Marchant & M. Lewington, *Fl. South West* 2: 839 (2002).

Distribution. Extends from the Busselton area east to Noggerup and south to the Scott River.

Phenology. Flowers recorded mainly from June to December.

Conservation status. Not considered to be at risk.

Notes. As indicated in Table 1, subsp. *formosus* is hairier below and on the inflorescences than subsp. *dasylepis*, but this difference is not always evident in fruiting material, in which the indumentum may be lost. A specimen from Noggerup (*A. Webb & C. Prowse* AW 2162) has hairier involucral bracts than is usual for this subspecies.

b. Isopogon formosus R.Br. subsp. **formosus**

Isopogon formosus var. *eriolepis* Meisn. in A.L.P.P. de Candolle, *Prodr.* 14: 278 (1856). *Type citation*: 'Preiss, n. 687!'. *Type specimens*: 'In arenosis sylvae circa oppid. Albany' [near Albany, Western Australia], 14 October 1840, *J.A.L. Preiss* 687 (*syn*: LD 1357877, MEL 1532913 & 1535660).

Isopogon heterophyllus Meisn. in J.G.C. Lehmann, *Pl. Preiss.* 1: 504 (1845). *Atylus heterophyllus* (Meisn.) Kuntze, *Revis. Gen. Pl.* 2: 577 (1891). *Type*: 'in region interior, Australiae merid.-occid.' [inland in the south-west of Western Australia], October 1840, *J.A.L. Preiss* 672 (*syn*: LD 1359077).

Isopogon occidentalis D.A.Herb, *J. & Proc. Roy. Soc. W. Australia.* 6: 105 (1921). *Type citation*: 'Cranbrook (Dr. Stoward), East from Solomon's Well; Stirling Range (Dr. A. Morrison)'. *Type specimens*: 'E from Solomon's Well' [Stirling Range, Western Australia], 28 September 1902, *A. Morrison s.n.* [*C.A. Gardner* 360a] (*syn*: PERTH 04230191); Cranbrook, Western Australia, 22 September 1911, *Dr Stoward s.n.* (*syn*: PERTH 04230027).

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildflowers* 1: 148 & 149 (1988) [as *I. formosus* and *I. heterophyllus*]; J.R. Wheeler, N.G. Marchant & M. Lewington, *Fl. South West* 2: 839 (2002).

Distribution. Extends in a near-coastal belt from Walpole north-east to Hopetoun and from Dalyup east to Cape Arid National Park. Survey is required to assess whether the apparent large disjunction of over 130 km between Hopetoun and Dalyup is real and not a collecting gap. We note that a number of other taxa from varied plant families have a similar disjunction in that region, including *Thryptomene saxicola* (Hook.) Schauer, which has a very similar overall distribution to *I. formosus* (Western Australian Herbarium 1998–).

Phenology. Flowers recorded mainly from May to November.

Conservation status. Not considered to be at risk.

New synonym. *Isopogon heterophyllus* was initially described from fruiting material with no flowers. Gardner (unpublished data; ms housed at Western Australian Herbarium) assigned material from the Stirling Range to this species but noted that it was 'perhaps only a variety' of *I. formosus*. Bentham (1870) and Blackall and Grieve (1988) separated *I. heterophyllus* from *I. formosus* by its less divided leaves, which they indicated as being sometimes simple and sometimes divided only towards the apex but not divided as extensively as in *I. formosus*. Few specimens previously assigned to *I. heterophyllus* have any simple leaves and those that do mostly occur in the Stirling Range and adjacent areas.

Foreman (1995) noted that specimens of *I. heterophyllus* had been confused with *I. formosus*. He distinguished *I. heterophyllus* by its 'thicker leaves which are characteristically grooved and wrinkled when dry', 'generally somewhat longer' flowers and more villous cone scales (Foreman 1995: 205), but did not mention any difference in the degree to which the leaves were divided. In his key Foreman separated the two taxa as 'Flowers to *c.* 25 mm long; leaves to 5.5 cm long, smooth' in *I. formosus* compared with 'Flowers to *c.* 30 mm long; leaves to 18 cm long, longitudinally wrinkled, thicker than above' in *I. heterophyllus*.

Isopogon heterophyllus is reduced herein to a synonym of. *I. formosus* subsp. *formosus* because no reliable differences could be found in any of the characters noted above. Among those specimens assigned by Foreman to one or other species, there appears to be a complete intergradation in leaf morphology and no separation in distribution. Cone scales vary from sparsely to very densely hairy, and flower length shows a great overlap between the two groups of specimens.

Isopogon teretifolius R.Br., *Trans. Linn. Soc. London* 10: 71 (1810); *Atylus teretifolius* (R.Br.) Kuntze, *Revis. Gen. Pl.* 2: 577 (1891). *Type citation*: 'In Novae Hollandiae orâ australi, Lewin's Land; in ericetis collibusque saxosis. (ubi v.v.)'. *Type specimen*: King George Sound, December 1801, *R. Brown s.n.* [Bennett No. 3246] (*syn*: BM 000991909 [which appears to comprise material from Brown's Herbarium and a 'Dryander duplicate', the latter of which is mounted to the lower left-hand corner of the sheet]).

Isopogon petrophiloides R.Br., *Suppl. Prodr. Fl. Nov. Holl.* 7 (1830). *Isopogon teretifolius* subsp. *petrophiloides* (R.Br.) Foreman, *Fl. Australia* 16: 481 (1995). *Type*: south-west coast of New Holland [Stirling Range to south coast of Western Australia], 1828–1829, *W. Baxter s.n.* (?*holo*: BM 000991908).

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildflowers* 1: 146 & 147 (1988) [as *I. teretifolius* var. *teretifolius* and var. *petrophiloides*]; D.B. Foreman, *Fl. Australia* 16: Figure 100 N & O (1995) [as *I. teretifolius* subsp. *teretifolius*].

Distribution. This species has quite a wide distribution in the south-west of Western Australia, occurring along the south coast between Denmark and Hopetoun, extending north-east to Alexander Morrison National Park and inland to near Hyden.

Phenology. Flowers recorded mainly from July to December but occasionally flowering throughout the year.

Conservation status. Not considered to be at risk.

Common name. Nodding Coneflower.

Type locality. Foreman (1995: 207) mistakenly gave the type locality of *I. petrophiloides* as 'near William' in an apparent misreading of the hand-written label on BM 000991908, which actually reads 'Mr William Baxter'. Baxter collected a number of species on and close to the Stirling Range (see George 2009: 286), and there seems little doubt that this was one of them.

New synonym. The type of subsp. *petrophiloides* is referable to a rare variant of *I. teretifolius* that has simple leaves; however, this variant can no longer be recognised as it completely intergrades with typical *I. teretifolius*. The simple-leaved variant occurs only in the vicinity of Stirling Range and an example of its intergradation with the typical variant is seen in two specimens, *D.J.E. Whibley* 5237 & 5238 (PERTH), collected 60 km north-east of Albany in 1974. *Whibley* 5238 shows the full range of leaf variation in *I. teretifolius*, from the typical deep leaf divisions through to simple leaves, whereas *Whibley* 5237 has all of its leaves either simple or with just a slight division into two or three short lobes at the apex.

Interestingly, the rare occurrence of simple leaves in *I. formosus* subsp. *formosus*, as discussed for that taxon above, is also largely restricted to the Stirling Range area where the simple-leaved variant of *I. teretifolius* occurs. Two other taxa that have intergrading variants with simple and divided leaves are *I. divergens* R.Br. and *I. scabriusculus* Meisn. subsp. *scabriusculus*.

Notes. Foreman (1995) gave a broader delimitation of *I. teretifolius* than is now accepted because he included the simple-leaved species now known as *I.* sp. Newdegate (D.B. Foreman 771) under subsp. *petrophiloides*. *Isopogon* sp. Newdegate had been recognised as distinct in 1962, when it was given the manuscript name *I. nutans* C.A.Gardner ms on the label of *C.A. Gardner* 13988. It is readily distinguished from *I. teretifolius* by its glabrous branchlets and young leaves, involucral bracts with hairs only on the central area, and tepals with a glabrous claw and densely hairy limb. This new species will be formally described in a forthcoming publication.

Acknowledgements

Types were examined using the JStor *Global Plants* website and Sweden's Virtual Herbarium.

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Barbara L. Rye and Michael Hislop

Western Australian Herbarium, Department of Parks and Wildlife,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983